# Posttraumatic Stress Disorder Among Vietnam Theater Veterans

## A Causal Model of Etiology in a Community Sample

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Data from the National Vietnam Veterans Readjustment Study, conducted from 1986 to 1988, were used to develop and cross-validate a model of the etiology of posttraumatic stress disorder (PTSD) among a community sample of 1198 male Vietnam theater veterans. The initial model specified causal paths among five sets of variables, ordered according to their historical occurrence: a) premilitary risk factors and traumas, b) war-related and non-war-related traumas during the military, c) homecoming reception, d) postmilitary traumas, and e) PTSD. The initial model was refined and then cross-validated, leading to the specification of a final model with highly satisfactory fit and parsimony. In terms of the magnitude of their contribution to the development of PTSD, lack of support from family and friends at the time of the homecoming and exposure to combat were the two most influential contributors. Other contributing factors, in order of importance, were Hispanic ethnicity, societal rejection at the time of homecoming, childhood abuse, participation in abusive violence, and family instability. Exposure to war-related and non-war-related traumas occurred largely independently of each other, with war-related traumas contributing substantially more than non-war-related traumas to the development of PTSD. Limitations to interpretation of the results are noted due to the retrospective nature of the data and the inevitable omission of other etiological factors.

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Posttraumatic stress disorder (PTSD) is the only diagnostic category in the American Psychiatric Association's (1987) *Diagnostic and Statistical Manual of Mental Disorders* that includes the designation of a specific etiology as a diagnostic criterion. This inclusion has helped to fuel an ongoing debate concerning the respective roles of traumatic and nontraumatic experiences in the causation of PTSD, especially in relation to the Vietnam war.

Multiple regression analysis has often been used as a statistical technique in an attempt to determine the predominant set of contributors (*e.g.*, Foy et al., 1984; Green et al., 1990a; Kulka et al., 1990a; Yager et al., 1984). This technique has an inherent limitation, however, that precludes a clear resolution, namely, an inability to allocate shared variance with PTSD between traumatic and nontraumatic events. Multiple regression analysis is a less than optimal analytical strategy for another reason as well. A consensus has begun to emerge around the position that both traumatic and nontraumatic events play etiological roles and that the most critical task is to articulate the network of connections among them (*e.g.*, Elder and Clipp, 1989; Green et al., 1985; Kulka et al., 1990a). A related issue concerns the contribution of non-war-related traumatic exposure to the development of PTSD among war zone veterans. Most of the attention has focused on childhood physical and sexual abuse (Carmen et al., 1984; Kulka et al., 1990a; Swett et al., 1990), but exposure to adult trauma is also relevant as a possible contributing factor (Baum et al., 1983; Davis and Friedman, 1985; Kilpatrick et al., 1979).

Structural equation modeling is an extension of multiple regression analysis that is well-suited to contributing to the resolution of these problems. Statistically, the extension involves the simultaneous solution of a set of equations and the use of all information in deriv-

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ing each of the parameter estimates in the model (cf., Bollen, 1989; Hayduk, 1987; James et al., 1982). Total effects can be partitioned into those that are direct or unmediated by any other variable and those that are indirect or mediated by one or more other variables. Conceptually, the extension involves the specification of a model of etiology that serves as a map to the selection of variables to be included in each equation.

Previously, we examined the etiology of PTSD symptoms in a treatment-seeking sample of Vietnam veterans (Fontana and Rosenheck, 1993). The data available for evaluating the model, however, were limited in three important ways. One was that the sample was drawn from those seeking treatment from Department of Veterans Affairs' clinics, thereby constraining its generalizability to the broader, community population of Vietnam theater veterans. The second was that there was no representation in the model of the availability of societal and familial support to veterans at the time of their homecoming. Several studies have reported that a negative reception by society at homecoming is associated with the development of PTSD (Kadushin et al., 1981; Stretch, 1985, 1986). Similarly, the absence of support from family and friends following the war has been reported to be related to the development of PTSD symptoms also (Card, 1987; Elder and Clipp, 1988; Escobar et al., 1983; Kadushin et al., 1981; Keane et al., 1985; Solomon and Oppenheimer, 1986; Stretch, 1986). The third limitation was that there was incomplete representation of non-war-related traumas.

The database from the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1990a) addresses all of these limitations. The database is composed of non-treatment-seeking veterans from the community; it includes information regarding the availability of societal and familial support at the time of homecoming, and it contains extensive information regarding the occurrence of nonmilitary traumas throughout the veterans' lives.

The size of the NVVRS database constitutes a fourth major advantage. Composed of almost 1200 male Vietnam theater veterans, it is large enough to permit subdivision into two random samples, each of which is sizable enough to yield stable parameter estimates. One sample can be used to refine a broad, relatively unrestricted model by restricting it further according to empirical results. The second sample can then be used to cross-validate the refined model as it was derived from the first sample. In this way, a model can be developed that represents the most robust and nonredundant set of likely contributors to the etiology of war-related PTSD.

Statistical considerations of multicollinearity (overlap among the variables) and multivariate normality make it necessary to choose among all the contributory factors that have been postulated for PTSD. In order to identify and select a set of variables that was both important empirically and suitable statistically, we chose to include those premilitary, military, and postmilitary variables that have been reported consistently in the literature to be related significantly to symptoms of PTSD or associated disorders and that possessed acceptable statistical properties.

The relevance of childhood abuse, nonmilitary adult traumas, and the homecoming reception was mentioned earlier. In our previous study of the etiology of PTSD in a treatment-seeking sample of Vietnam veterans (Fontana and Rosenheck, 1993), we included several other premilitary and military experiences that have been reported in the literature to be related consistently and significantly with PTSD. Also pertinent to the present study are the premilitary variables, academic difficulty, an unstable or problematic family, problems with authorities and behaviors indicative of a conduct disorder, and black and Hispanic ethnicity.

Moreover, several studies have found that veterans with a premilitary background of academic difficulty, an unstable family, a history of physical and/or sexual abuse, problems with authorities and antisocial behavior, or ethnic minority status were those who experienced heavier combat or who participated in abusive violence (e.g., atrocities).

With few exceptions, more severe PTSD and general psychiatric symptoms have been found to be associated with greater combat exposure and with participation in abusive violence. Receipt of a disciplinary action, such as a court-martial or an Article 15 (which empowers the company commander to dispense punishment for an infraction of the military code of conduct), while in the military has been reported to be related to severity of PTSD and associated symptoms. Further, disciplinary actions for violence were more frequent among combat than among support troops. A more detailed review of studies supporting the selection of these variables for inclusion in the model has been presented in our previous paper (Fontana and Rosenheck, 1993).

We seek to address two general issues on the basis of the final model. The first concerns the relative contributions of different categories of experiences to the development of PTSD symptoms. Of particular interest are the comparisons among premilitary, military, and postmilitary factors; between traumatic and nontraumatic experiences; and, within traumatic experiences, between military and nonmilitary experiences. Although military experiences in general and military traumatic experiences in particular are posited to be the major causes of PTSD symptoms, nonmilitary traumatic experiences are posited to exert a causal influence as well. Further, nontraumatic risk factors are posited to play an etiological role either through their

impact on exposure and/or reactivity to traumatic experiences or through their potentiation of the general stressfulness of service in a war zone.

The second issue concerns the nature of the major pathways mediating causation between sets of variables across the historical time intervals of the model. Although the data (with the exception of PTSD symptoms) were collected retrospectively, the sets of variables were chosen for their historical ordering. Of particular interest was the etiological role of the homecoming because of its relative neglect in the literature to date. A nonsupportive reception at homecoming is posited to lead to the "hardening" of acute PTSD symptoms into their impacted, chronic form.

## Methods

### Sample

The NVVRS includes a national sample of 1198 male Vietnam theater veterans who were selected from a computerized military personnel registry. Vietnam theater veterans are those who served in Vietnam or its surrounding waters or airspace for some period of time from 1964 to 1975. Black and Hispanic veterans were oversampled deliberately in the NVVRS to ensure stable values for prevalence estimation. Veterans averaged 40.1 (SD = 5.3) years of age, with 13.4 (SD = 2.4) years of education. Ethnically, 48.9% were white, 26.8% were black, 22.9% were Hispanic, and 1.4% were of other ancestry. In terms of their marital status, 71.3% were married, 21.3% were divorced or separated, and 6.8% had never been married. Using the unadjusted prevalence data from the NVVRS, 21% of the sample were suffering from PTSD at the time of the survey, which was conducted from 1986 to 1988.

For analytical purposes, the sample was divided into two random subsamples of 599 each. The subsamples did not differ significantly between themselves on any of the background or model variables. Due to the complexity of the model, we elected to include only veterans with complete data in the analyses. Therefore, there were 569 veterans in the first subsample and 570 veterans in the second subsample for the estimation of model parameters.

### Measures

Premilitary risk factors and traumas are represented by five variables.

1. Childhood physical or sexual abuse (ABUSE) is a dichotomous variable that was determined from the list of traumatic events and explicit physical abuse. Any event that the veteran characterized as "physical assault, torture, rape, abuse, mugging or similar assault (not war-related)" that involved him as a victim and that occurred before he was 18 years of age was coded

positive for ABUSE. In addition, a veteran's report that as a child he had been spanked or hit "hard enough that [he] had marks or bruises, had to stay in bed, or see a doctor" was coded positive for ABUSE (mean ± SD, .22 ± .41). Several of these items relied upon the veteran's own characterization of his experience(s) as constituting abuse or a trauma. It is likely, therefore, that the reports provide a conservative estimate of exposure (cf., Rausch and Knutson, 1991).

2. & 3. Ethnic minority status was measured dichotomously as BLACK (mean ± SD, .27 ± .44) and HISPANIC (.23 ± .42).

4. Eleven behaviors indicative of a conduct disorder before the age of 15 (COND DIS) were taken from the list compiled by Helzer (Helzer, 1981; Helzer et al., 1987). COND DIS is the number of these behaviors endorsed as having been engaged in frequently: in trouble with the law or school officials, playing hooky, suspended or expelled from school, doing poorly academically, arrested or sent to juvenile court, running away from home, lying, drinking or using drugs, stealing, destroying property, and starting fist fights (mean ± SD, 1.77 ± 1.85).

5. Family instability (FAM INST) was measured by the Family Stability Scale (Kadushin et al., 1981). It is the sum of 11 dichotomous items covering experiences before the age of 18, such as parental separation, divorce or death, living in a foster home or orphanage, father out of work, family income below the poverty level, getting into trouble with authorities, and having less than a high school education at the time of entry into the military (mean ± SD, 2.66 ± 1.76).

War-related traumatic exposure and adjustment to the military are represented by three variables.

6. Combat was measured using two scales: the Revised Combat Scale (Laufer et al., 1981) (REV COM) (mean ± SD, 7.71 ± 4.38) and the Combat Exposure Scale (Keane et al., 1989) (EXP COM) (19.45 ± 11.97). These scales measure traditional aspects of warfare that have been considered necessary and appropriate to the legitimate goals of war. They correlated .83 with each other in the present study. Therefore, a latent variable of COMBAT was generated in the model to represent this category of traumatic exposure.

7. Participation in abusive violence was determined from several questions asking whether the veteran participated personally in situations in which American or South Vietnamese troops terrorized, wounded, or killed civilians; tortured, wounded, or killed prisoners or hostages; or mutilated enemy or civilian bodies. Because of the overlap among these questions, we coded participation (PARTICIP) as a dichotomous variable (mean ± SD, .32 ± .47).

8. Having received a disciplinary action (DISCIP) was coded dichotomously from questions asking whether

the veteran ever received any disciplinary actions while in the military, including restriction to quarters, loss of pay, demotion, an Article 15, or a court-martial (mean ± SD, .36 ± .48).

9. Nonmilitary traumatic exposure during the military was coded dichotomously, as derived from the non-war-related traumas that were reported to have involved the veteran as a victim and to have occurred between the age of 18 and the time of discharge from the military (NONMIL) (mean ± SD, .16 ± .37). These experiences included events such as a serious accident, fire, or explosion; a natural disaster; or seeing someone mutilated, seriously injured, or killed.

The homecoming reception is represented by two variables.

10. Society's welcome was measured as the sum of three questions (alpha = .79) concerning the extent to which the American people made veterans feel at home again, respected him for having served in the armed forces, and made him feel proud to have served in the armed forces (mean ± SD, 8.83 ± 3.31). Welcome was coded in the negative direction, with high scores representing a rejecting welcome (REJ WELC).

11. The family's support was measured by two scales, both of which were coded in the direction of low support. The unavailability of help (LOW HELP) is the sum of four questions (alpha = .78) asking whether, at the time of homecoming, there was someone he could turn to in time of need, someone from whom he could borrow money in case of an emergency, someone he could count on to help him in case of a serious injury or illness, and someone he could count on to pick up his spirits when he was feeling down (mean ± SD, 1.55 ± 1.06). The unavailability of someone to talk to and confide in at the time of homecoming (LOW TALK) is the sum of three questions (alpha = .64) asking whether he had anyone in his life that he could talk with and that he could count on for understanding and advice, and asking whether there were people with whom he actually did talk about the war (3.70 ± .96). LOW HELP and LOW TALK were correlated .43 with other, so a latent variable of LOW SUPP was generated in the model.

12. Postmilitary traumas were derived from the list of traumas that were reported to have involved the veteran as a victim and to have occurred since discharge from the military and are represented dichotomously (POSTMIL) (mean ± SD, .41 ± .49).

13. Posttraumatic stress disorder is represented by the predicted probability of being diagnosed with PTSD as computed by the NVVRS. This variable was derived by optimizing the prediction of PTSD, as determined by psychiatric interview in a clinical subsample, from other variables that were available in both the clinical subsample and the total survey sample (Kulka et al.,

1990b). The resulting logistic regression equation from the clinical subsample was then applied to the same variables in the survey sample to generate the probability of being diagnosed with PTSD. This variable is the basis for the estimates of prevalence generally cited from the study. The mean, before sociodemographic adjustment, is .21 (SD = .32).

*Data Analyses*

Although the data used in this study are cross-sectional and the reporting is retrospective, the variables selected for inclusion in the model have a clear historical ordering. This ordering was used as the logical basis for specification of the initial model. In the first subsample, each historical set of variables was hypothesized to contribute causally to each subsequent set. Within war-related experiences themselves, we hypothesized that combat exposure provided the opportunities for participating in abusive violence. In the second subsample, the model was restricted to specifying only those paths for estimation that were significant in the first subsample. Finally, a model that specified only those paths that were significant in both subsamples was evaluated for adequacy as the most preferable model. Parameters for the final model were estimated from the total sample in order to generate the most stable and representative values.

Statistically, the adequacy of a model can be judged from its fit and its parsimony (Bentler, 1990; James et al., 1982). Fit refers to the extent to which the values estimated by the model correspond to the actual values in the data set. In the extreme, where the maximum number of parameters are estimated (that is, where the degrees of freedom are zero), fit is necessarily perfect and is therefore meaningless. What is desirable, therefore, is to achieve a high degree of fit with the estimation of as few parameters as possible. In this way, the parsimony of the model is optimized. Parsimony indices essentially adjust the goodness of fit achieved for the degrees of freedom necessary to achieve it.

Derivation of indices of fit and parsimony remains an active area of statistical research. Because there is no consensus as yet concerning the superiority of any one index, we have selected two indices of each which capture different aspects of the feature under consideration. For fit, we have selected the root mean square residual (RMR) and Bentler's (1990) comparative fit index (CFI). The RMR provides an indication of how well competing models within a nested set estimate the parameters relative to the actual parameters. The limitation to the RMR is that its values have meaning only within the particular set of models under consideration. The CFI is an improvement on the earlier normed fit index (Bentler and Bonett, 1980) by virtue of the elimination of its sensitivity to sample size. The CFI

ranges between 0 and 1.00, with higher values signifying better fit. Values of the CFI are generalizable across different models.

For parsimony, we have selected the consistent information criterion (CIC) and the parsimonious fit index (PFI). The CIC (Bozdogan, 1987) is a refinement of Akaike's (1973) information criterion, and represents the amount of information accounted for by the model relative to the degrees of freedom needed to account for it. The larger the negative value of the CIC, the more parsimoniously the model captures information. The PFI (James et al., 1982) is essentially an adjustment of the normed fit index for the degrees of freedom used to attain the fit. It ranges from 0 to 1.00, with higher values indicating more parsimonious fit.

Each overall model is composed of two measurement models and a structural equation model. The measurement models generate latent variables that are assumed to underlie and to give rise to specific observable indicators that can be measured. In the present model, REV COM and EXP COM are specified to be observable indicators of an underlying dimension of COMBAT exposure, and LOW HELP and LOW TALK are specified to be manifestations of the underlying dimension of LOW SUPPORT.

The structural equation model specifies the causal paths that are posited to exist between exogenous and endogenous variables and among the endogenous variables themselves. In the present model, the five premilitary variables are exogenous variables whose causation lies outside the scope of the model. These variables are posited to affect war-related and non-war-related war zone experiences, the homecoming, postmilitary traumas, and PTSD. Noncausal associations among the exogenous variables were included in the statistical evaluation of the model, but, in the interests of clarity of exposition, these associations are not diagrammed in Figure 1. War zone experiences, the homecoming, postmilitary traumas, and PTSD symptoms are endogenous variables that are posited to have been caused by the exogenous variables and the antecedent endogenous variables.

Before the models' parameters were estimated, the data were checked for outliers. One case with extreme values was detected in the first subsample and was dropped from further analyses. The kurtosis was also examined for each variable. Kurtosis refers to the peakedness or flatness of a distribution relative to the shape of a normal distribution. Logarithmic transformations were performed on each variable where its kurtosis could be made to approach normality more closely. The variables thus transformed were childhood conduct disorder behavior (COND DIS), combat exposure as measured by the Revised Combat Scale (REV COM), and societal welcome (REJ WELC). Examination of

the multivariate kurtosis (Mardia, 1970) of each of the subsamples revealed that each was substantially flatter than normal, thereby making an assumption of multivariate normality unjustifiable for analytic purposes. Therefore, we selected generalized least squares for the method of model parameter estimation, because it does not depend upon such an assumption. For model parameter estimation, we used the CALIS procedure of the SAS software package (SAS Institute, 1990). The final model is diagrammed in Figure 1. The small arrows that are attached to each variable but do not proceed from another variable indicate the disturbance (that is, the proportion of variance unaccounted for by the model) associated with each variable.[2]

## Results

Summary results of the steps in model development are presented in Table 1. The first step was to determine the adequacy of the initial model on the first subsample ($\chi^2$ = 74.75, 29 $df$, $p$ < .0001). The CFI of .992 for this relatively unrestricted model indicates that it achieved a very high degree of fit. Concomitantly, the CIC of −138 and the PFI of .273 reveal that the parsimony of the fit was quite low. The second step was to refine the model by restricting the specified paths to those that were significant in the initial model and then to cross-validate this more restrictive model on the second subsample ($\chi^2$ = 167.47, 64 $df$, $p$ < .0001). The RMR increased somewhat, but there was virtually no erosion of the goodness of fit as measured by the CFI. Moreover, there was a major improvement in the parsimony with which this same level of fit had been attained, with a CIC of −303 and a PFI of .594. The third step was to restrict the model even further by specifying only those paths that were significant in both subsamples. This replicated model was then evaluated for its adequacy on the total sample ($\chi^2$ = 285.67, 70 $df$, $p$ < .0001). The fit indices indicate very little change in the RMR and CFI. The parsimony indices show that the maintenance of fit was achieved without a problematic decrease in parsimony. The CIC indicates that the replicated model was somewhat less efficient than the cross-validated model, but the PFI indicates an increase in parsimony for the replicated model.

The replicated model is diagrammed in Figure 1. The disturbance term for PTSD is .52, indicating that the model accounts for 48% of the variance in PTSD.

The measurement models indicate that the latent variable COMBAT is highly saturated with the variance from both combat scales, with loadings of .78 and .98. The latent variable LOW SUPP is moderately saturated

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[2]Bivariate correlations among the variables in the model are available from the authors for the two subsamples.

TABLE 1
*Adequacy of the Models According to Fit and Parsimony*

| | Fit | | Parsimony | |
|---|---|---|---|---|
| Model | RMR | CFI | CIC | PFI |
| Initial (MI) | .044 | .992 | −138 | .273 |
| Cross-validated (MCV) | .085 | .984 | −303 | .594 |
| Replicated (MR) | .086 | .982 | −277 | .651 |

with variance from its manifest indicators, with loadings of .67 and .55.

## Premilitary Risk Factors and Traumas

Hispanic veterans were more prone to develop PTSD than other veterans. This effect was unmediated by any of the other variables in the model. Black veterans, on the other hand, received more disciplinary actions while in the military and experienced fewer traumas postmilitary than other veterans. Postmilitary traumas, in turn, contributed significantly to the development of PTSD.

Family instability contributed directly to receiving more disciplinary actions while in the military and low support from family and friends at homecoming. Low support, in turn, contributed directly to the development of PTSD. Veterans who were abused as children developed more severe PTSD symptoms through the mediation of other variables. Abused veterans received both a more rejecting welcome from society and low support from their family and friends. Both of these variables, in turn, contributed directly to the development of PTSD.

## War-related Traumatic Exposure and Discipline in the Military

Among war zone experiences, exposure to combat and participation in abusive violence contributed directly to the development of PTSD. In addition, combat exposure had indirect effects on PTSD, mediated



FIG. 1. Replicated etiological model for PTSD.

through participation in abusive violence and low support.

## Non-war-related Traumatic Exposure During and After the Military

Exposure to nonmilitary traumas during the military had no impact on other variables. Exposure to postmilitary traumas, however, did contribute significantly to the development of PTSD.

## Homecoming Reception

Both a rejecting welcome by society and low support from family and friends contributed directly to the development of PTSD. In addition, low support contributed indirectly to PTSD through the mediation of postmilitary traumas.

## Summary of Effects

Total effects were .34 (19.8%) for premilitary risk factors, .53 (30.8%) for military experiences, and .85 (49.4%) for postmilitary experiences. Total effects were .69 (40.1%) for traumatic exposure and 1.03 (59.9%) for nontraumatic factors. Within traumatic exposure alone, military exposure accounted for 76.8% of the total trauma effects.

## Discussion

The three-stage process of model development produced an increasingly parsimonious model of the etiology of PTSD. The final model is robust in that it consists of causal propositions that are both replicable and nonredundant. In terms of total effects, the more proximal the factors are to current PTSD, the greater their contribution is to its development. Military traumas are three times more influential than nonmilitary traumas in the development of PTSD. Among military traumas, combat was clearly the more influential category, with a strong direct effect and a substantial indirect effect mediated through participation in abusive violence. Additionally, participation in abusive violence had a sizable direct effect. The emergence of both of these trauma categories as significant contributors to PTSD symptoms supports the contention that abusive violence constitutes an important additional source of traumatic exposure to that of combat as the latter has been traditionally conceived (Laufer et al., 1984). The prominence of combat and participation in abusive violence was also found in our earlier study of PTSD symptoms in a treatment-seeking sample (Fontana and Rosenheck, 1993). These similarities reinforce the robustness of these findings as generalizations that are likely to hold across diverse populations of Vietnam theater veterans.

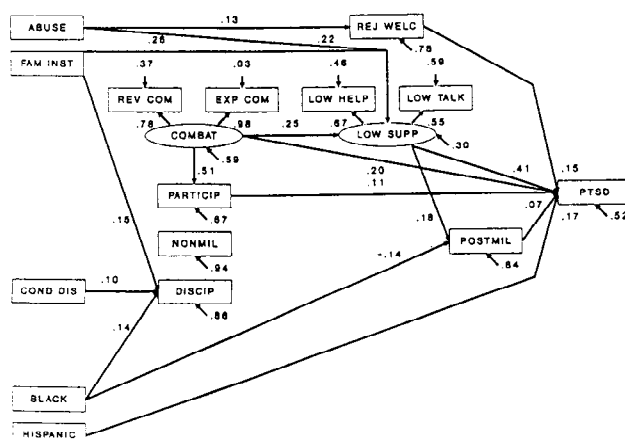A noteworthy feature of military and nonmilitary

traumas is that the occurrence of each category is essentially independent of the other. Exposure to nonmilitary traumas does not seem to influence exposure to military traumas and vice versa. It may be that the circumstances of traumatic exposure are different enough in the military and in civilian life that the two categories represent largely different processes.

Civilian traumas generally cast a person in the role of victim. Military traumas, in contrast, often cast a person in the role of perpetrator. It is this role of perpetrator rather than victim which we believe accounts for the influence of combat on participation in abusive violence. The more one is exposed to combat, the more occasions there are for one to engage in abusive violence. It may be that abusive violence is an inevitable feature of war, and that simply being in combat heightens the chances that one would participate in it. In addition, being in combat heightens the occasions for one to be exposed to specific experiences, such as having a buddy killed or seeing the results of abusive violence committed by the enemy. Such experiences are likely to have generated severe rage and desire for revenge, prompting abusive retaliation.

Nontraumatic factors overall, however, are even more influential than traumatic factors, primarily owing to the large effect that lack of support from family and friends at the time of homecoming has on the development of PTSD. We believe that the homecoming is a critical event in determining whether acute stress reactions are either diminished to subclinical intensity or are preserved undiminished to become recognized at some later point as PTSD. Many veterans return home with doubts concerning the legitimacy and justifiability of their violent and destructive actions during wartime. An accepting reception confers societal endorsement of the legitimacy and justifiability of their actions. A supportive audience enables veterans to express their feelings and thoughts to others, thereby facilitating a constructive assimilation of their war experiences into their civilian lives. A rejecting reception, on the other hand, conveys society's condemnation of their wartime behavior, confirming veterans' own doubts concerning the legitimacy and justifiability of their actions. Lack of support closes off avenues for veterans to ventilate their feelings and to assimilate the meaning of their experiences. Under these circumstances, acute stress reactions become repetitive and persistent PTSD symptoms. As time passes, veterans make dysfunctional accommodations in their lives to try to cope with the persisting symptoms. Posttraumatic stress disorder then becomes reinforced by substance abuse and role failure. Finally, it is likely that the support that was available from others at homecoming is typical of the support that was available in the ensuing years as well. The availability of little or no support could also be expected to perpetuate and reinforce entrenchment of PTSD as a chronic condition.

Among the premilitary risk factors, black and Hispanic ethnicity, childhood abuse, and family instability emerged as substantial contributors. The influence of black and Hispanic ethnicity is consistent with the elevated prevalence reported in the NVVRS (Kulka et al., 1990a). The model is not helpful, however, in explaining the causes of these elevations. Black ethnicity is mediated by a relative *absence* of postmilitary traumas, while there is only a direct effect for Hispanic ethnicity. The explanation awaits further investigation that might aid in the specification of effective mediators.

The work of Elder and Clipp (1989) is germane to understanding the influence of childhood abuse and family stability. These authors have reported that men who were high in "ego-resilience" prior to the military were less likely to be bothered by psychiatric symptoms in later years than their less resilient peers. It is reasonable to suspect that one of the detrimental effects of being abused as a child and of growing up in an unstable family is a failure to acquire an ability to cope with adversity in general and with traumatic events specifically.

In contrast to the factors discussed above, adjustment to military life in terms of disciplinary actions displayed a checkered pattern of influence on the development of PTSD. In the present study, there was a significant direct effect in one subsample but not in the other. In our earlier study of PTSD symptoms in a treatment-seeking sample (Fontana and Rosenheck, 1993), we failed to find a significant causal role for having been disciplined in the military. Thus, although the bivariate relationships and the path in one subsample are consistent with reports in the literature, the influence of military disciplinary actions does not appear to be replicable and nonredundant with other effects.

Before concluding, it is important to acknowledge two limitations to our efforts. One is the inherent caution that the retrospective nature of the data demands of any interpretations. Even though events could be ordered unambiguously in terms of their historical occurrence, it is possible that a retrospective bias to veterans' reporting might have introduced connections among variables that might not have existed as they actually occurred. The extent to which such connections were likely to be introduced is unclear. For example, in one study, it has been reported that the absence of symptoms diminished the accuracy with which people reported a traumatic event (McFarlane, 1988). On the other hand, in another study, it was found that people's reports were quite accurate for the most part, and that even when reports of trauma were elevated subsequently, the rank order of their severity was preserved (Norris and Kaniasty, 1992). In any event, the retrospective nature of the data introduces a caveat to the veridicality of causation as it has been modeled and supported empirically in the present study.

A second limitation is the omission of some important etiological factors. Mention has already been made of the need for the specification of effective mediators of the effect of black and Hispanic ethnicity. Certain other factors, such as a genetic predisposition (True et al., 1993), could not be included because the information was not collected as part of the data set. This is not an indictment of the NVVRS, since an etiological role was not envisioned for genetic factors at the time of the study. Other factors, such as postmilitary employment or marital adjustment or substance abuse, had to be omitted because an equally strong case could be made for causation in either direction. The fact that 52% of the variance in PTSD was unaccounted for by our model leaves room for these and other factors to play an etiological role.

We believe that our model has value, however, from two perspectives. First, it suggests that PTSD develops from a multiplicity of influences from a multiplicity of time periods. Second, it provides a heuristic framework for progressively filling in the missing pieces as more research findings and more inclusive data become available.

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